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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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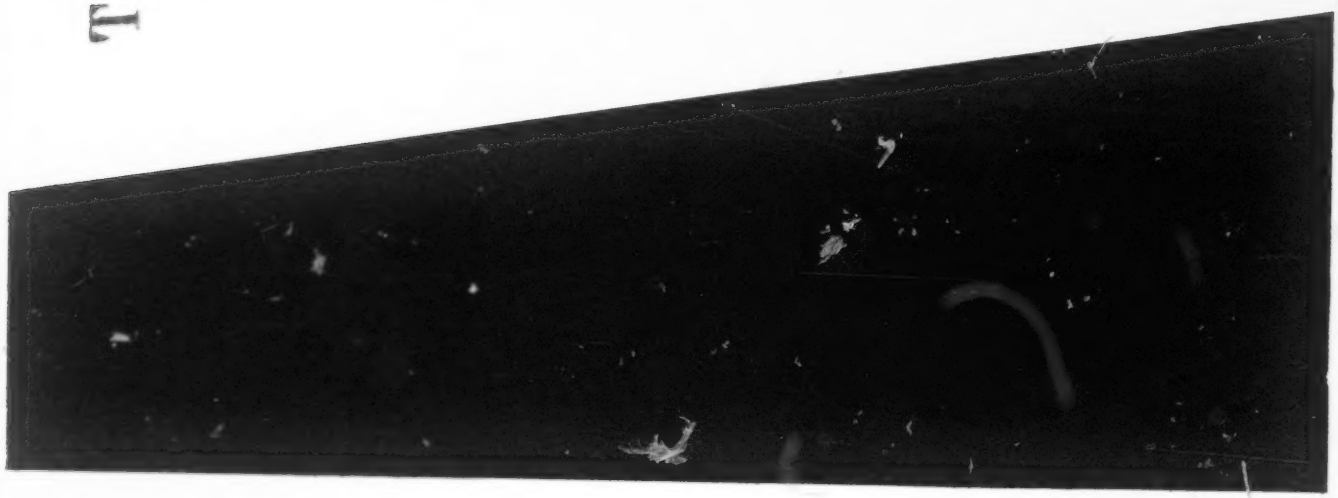
Development of USES Aptitude Test Battery for Log Scaler

(logging; paper and pulp; sawmill) 941.488



U.S. DEPARTMENT OF LABOR
W. Willard Wirtz, Secretary
MANPOWER ADMINISTRATION
BUREAU OF EMPLOYMENT SECURITY
Washington, D.C. 20210

TECHNICAL REPORT ON DEVELOPMENT

OF USES APTITUDE TEST BATTERY FOR...

LOG SCALER (logging; paper & pulp; sawmill) 941.488

S-390

U. S. Employment Service
in Cooperation with
Idaho, Oregon, and Washington State Employment Services

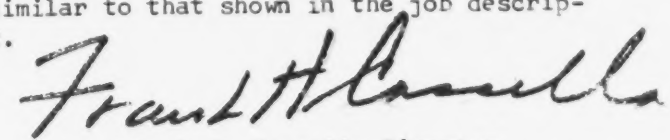
February 1967

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.



Frank H. Cassell, Director
U. S. Employment Service

GATB Study #2638

Development of USES Aptitude Test Battery

for

LOG SCALER (logging; pulp & paper; sawmill) 941.488
S-390

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Log Scaler 941.488. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
N - Numerical Aptitude	90
P - Form Perception	80
K - Motor Coordination	75

Research Summary

Sample: 75 male workers employed by various employers in Idaho, Oregon, and Washington.
Criterion: Supervisory ratings.
Design: Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity: Phi Coefficient = .53 ($P/2 < .0005$)

Effectiveness of Norms: Only 72% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 88% would have been good workers. 28% of the of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms only 12% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

Table 1
Effectiveness of Norms

	Without Tests	With Tests
Good Workers	72%	88%
Poor Workers	28%	12%

Sample Description

Size: N = 75

Occupational Status: Employed Workers (no sawmill deck scalers were included in this sample).

Work Setting: Workers were employed by the following:

Columbia River Log Scaling and Grading Bureau, Portland, Oregon.
U. S. Forest Service, Region #6, Portland, Oregon.
SDS Lumber Co., Bingen, Washington.
Boise Cascade Corp., Emmett, Idaho.
Potlatch Forests Inc., Headquarters, Idaho.

Employer Selection Requirements:

Education: High school graduate preferred.
Previous Experience: None required.
Tests: U. S. Forest Service scalers must have passed a Federal Civil Service Examination for an entry job with the Forest Service.
Other: Personal interview.

Principal Activities: The job duties for all workers are comparable to those shown in the job description in the appendix.

Minimum Experience: All workers in the sample had at least 30 months total job experience.

Table 2

Means, Standard Deviations(SD), Ranges and Pearson Product-Moment Correlations With The Criterion (r) for Age, Education, and Experience

	Mean	SD	Range	r
Age (Years)	38.9	10.2	22-64	-.137
Education (Years)	11.7	2.0	2-16	.185
Experience (Months)	99.8	30.2	30-480	.361 **

** Significant at the .01 level.

Experimental Test Battery

All 12 tests of the GATB, B-1002B were administered from 1964 to 1966.

Criterion

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the test data were collected. Two ratings were made by the workers' immediate supervisors with a time interval of at least two weeks between the ratings.

Rating Scale: USES Form SP-21, "Descriptive Rating Scale." This scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability: The correlation between the two ratings is .89 indicating satisfactory reliability. The final criterion consisted of the combined scores of the two sets of ratings.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	50-90
Mean:	74.0
Standard Deviation:	8.3

Criterion Dichotomy: The criterion distribution was dichotomized into low and high groups by placing 28% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were considered "good workers" and those in the low group as "poor workers." The critical score is 70.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were considered for inclusion in the norms on the basis of a qualitative analysis of job duties involved and a statistical analyses of test and criterion data. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

Table 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Making judgments; learning and understanding rules and regulations.
N - Numerical Ability	Computing the board foot volume of logs.
P - Form Perception	Inspecting logs for defects.
Q - Clerical Perception	Recording measurements and volumes; reading scale stick and tape.
M - Manual Dexterity	Handling and using equipment necessary for performing job duties.

Table 4

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=75

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	105.6	15.5	73-150	.388**
V - Verbal Aptitude	102.6	15.5	72-141	.284*
N - Numerical Aptitude	99.2	15.1	64-145	.487**
S - Spatial Aptitude	107.8	17.2	61-156	.220
P - Form Perception	104.5	21.0	62-159	.373**
Q - Clerical Perception	106.1	14.5	80-150	.420**
K - Motor Coordination	100.4	17.6	62-148	.330**
F - Finger Dexterity	84.9	20.4	45-132	.116
M - Manual Dexterity	99.5	23.5	33-161	.107

*Significant at the .05 level
**Significant at the .01 level

Table 5

Summary of Quanitative and Qualitative Data

Type of Evidence	Aptitudes G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	x	x		x	x				x
Irrelevant									
Relatively High Mean	x			x		x			
Relatively Low Standard Deviation						x			
Significant Correlation with Criterion	x	x	x		x	x	x		
Aptitudes to be Considered for Trial Norms	G	V	N		P	Q	K		

Derivation and Validity of Norms

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, P, Q, and K at trial cutting scores were able to differentiate between the 72% of the sample considered good workers and 28% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly higher than one standard deviation below the means will eliminate about one-third of the sample; for four aptitude trial norms, cutting scores slightly lower than one standard deviation below the means will eliminate about one-third of the sample. The phi coefficient was used as a basis for comparing trial norms. Norms of N-90, P-80, and K-75 provided the best differentiation for the occupation of Log Scaler 941.488. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .53 (statistically significant at the .0005 level).

Table 6

Concurrent Validity of Test Norms N-90, P-80, and K-75

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	9	45	54
Poor Workers	15	6	21
Total	24	51	75

Phi Coefficient (ϕ) = .53 Chi Square (X^2) = 20.8

Significance Level = $P/2 < .0005$

Determination of Occupational Aptitude Pattern

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.

11/56
SP-21

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score_____

RATING SCALE FOR_____
D.O.T. Title and Code

Directions: Please read the sheet "Suggestions to Raters" and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print)_____
(Last) (First)

Sex: Male___ Female___

Company Job Title:_____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

Person to be rated: _____

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

- ☐ Capable of fair work output. Can perform at an acceptable but not fast pace.
- ☐ Capable of very high work output. Can perform at an unusually fast pace.
- ☐ Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ Capable of high work output. Can perform at a fast pace.
- ☐ Capable of low work output. Can perform at a slow pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ Good, but the grade of his work is not outstanding. Performance is usually superior in quality.
- ☐ Very poor. Does work of unsatisfactory grade. Performance is inferior and almost never meets minimum standards.
- ☐ Very good. Does work of outstanding grade. Performance is almost always of the highest quality.
- ☐ Fair. The grade of his work is mediocre. Performance is acceptable but usually not superior in quality.
- ☐ Not too bad, but the grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

- ☐ Very inaccurate. Makes very many mistakes. Work needs constant checking.
- ☐ Fairly accurate. Makes mistakes occasionally. Work needs only normal checking.
- ☐ Accurate. Makes few mistakes. Work seldom needs checking.
- ☐ Inaccurate. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ Highly accurate. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials, and methods that have to do directly or indirectly with his work.)

- ☐ Has complete knowledge. Knows his job thoroughly.
- ☐ Has broad knowledge. Knows enough to do good work.
- ☐ Has very limited knowledge. Does not know enough to do his job adequately.
- ☐ Has moderate amount of knowledge. Knows enough to do fair work.
- ☐ Has little knowledge. Knows enough to "get by".

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

- ☐ Low aptitude. Usually has some difficulty doing his job. Not too well suited to this kind of work.
- ☐ High aptitude. Usually does his job without difficulty. Well suited to this kind of work.
- ☐ Very low aptitude. Has great difficulty doing his job. Not at all suited for this kind of work.
- ☐ Very high aptitude. Does his job with great ease. Unusually well suited for this kind of work.
- ☐ Moderate aptitude. Does his job without too much difficulty. Fairly well suited to this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

- ☐ A large variety. Can perform several different operations efficiently.
- ☐ A very limited variety. Cannot perform different operations adequately.
- ☐ An unusually large variety. Can do very many different operations efficiently.
- ☐ A small variety. Can perform few different operations efficiently.
- ☐ A moderate variety. Can perform some different operations with reasonable efficiency.

G. **How resourceful** is he when something different comes up or something out of the **ordinary** occurs. (Worker's ability to apply what he already knows to a new situation.)

- ☐ Very unresourceful. Almost never is able to figure out what to do. Needs help on even minor problems.
- ☐ Very resourceful. Practically always figures out what to do himself. Rarely needs help, even on complex problems.
- ☐ Unresourceful. Often has difficulty handling new situations. Needs help on all but simple problems.
- ☐ Resourceful. Usually able to handle new situations. Needs help on only complex problems.
- ☐ Fairly resourceful. Sometimes know what to do, sometimes doesn't. Can deal with problems that are not too complex.

H. How often does he make practical suggestions for doing things in better ways? (Worker's ability to improve work methods.)

☐ Once in a while. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ Very often. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

☐ Never. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ Frequently. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ Very seldom. Slow to see new ways to improve methods. Contributes few practical suggestions.

I. Considering the factors already rated, and only these factors, how satisfactory is his work? (Worker's all-round ability to do his job.)

☐ Outstanding. An unusually competent worker. Performance almost always top notch.

☐ Not completely satisfactory. Of limited value to the organization. Performance somewhat inferior.

☐ Good. A valuable worker. Performance usually superior.

☐ Satisfactory. A fairly proficient worker. Performance generally acceptable.

☐ Definitely unsatisfactory. Would be better off without him. Performance usually not acceptable.

February 1967

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FACT SHEET

JOB TITLE: LOG SCALER (logging; paper & pulp; sawmill) 941.488

JOB SUMMARY: Measures and inspects logs on skids, trucks, railroad cars or in water to determine length, diameter, species, and grade, using measuring tape, scale stick, Scribner's Scale, and scaling rules and regulations. Records gross and net measurements, grade, and species on log scaling sheet. Computes footage of merchantable wood in logs and records or sends scale sheets to scaling office where footage is determined.

WORK PERFORMED: Attaches measuring tape to one end of log and walks to other. Reads length of log from tape and records on scale sheet. Measures diameter of small end or each end if required, with scale stick or short tape, and records. Inspects ends of logs for splits, checks, spangles, pitch seams, rings, rot, disease, or breaks. Jabs spud at end of scale stick into end of defective log and breaks out small pieces to determine the kind and extent of rot or disease. Estimates amount of log that should be deducted as non-merchantable because of defects or mechanical damage. At some locations, logs are scaled on maximum of 20 foot length (40 foot log is scaled as two or more separate logs, depending on defects and shape). Grades logs according to established grading rules and regulations. Culls log if less than one-third is merchantable. Determines log species such as Douglas Fir, pine, hemlock, white fir, or other. Records net length and diameter, grade, and species on scale sheet. Determines board foot volume of log with Scribner's Scale, or reads it from scale stick and records, or sends scale sheets to scaling office where footage is computed.

Climbs onto logs on trucks or railroad cars to collect and record scaling data. Walks and balances on logs while scaling on mill ponds or river rafts. Computes board feet in logs or explains scaling rules and regulations of scaling bureaus or government agencies to log buyers, sellers, or haulers by special request. May work with assistance of measureman, truck driver, or another scaler to make and record log measurements.

(This sheet is printed in duplicate. One copy should remain as part of the Appendix in order to complete the technical report. The other copy can be removed by employment service personnel who wish to set up separate fact sheet files.)

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